



ARL-TR-7324 • JUNE 2015



Cold Environment Assessment Tool (CEAT) User's Guide for Apple Mobile Devices

by David Sauter

Approved for public release; distribution unlimited.

NOTICES

Disclaimers

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of manufacturer's or trade names does not constitute an official endorsement or approval of the use thereof.

Destroy this report when it is no longer needed. Do not return it to the originator.



Cold Environment Assessment Tool (CEAT) User's Guide for Apple Mobile Devices

by David Sauter

Computational and Information Sciences Directorate, ARL

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) June 2015		2. REPORT TYPE Final		3. DATES COVERED (From - To) 15 Nov 2014–31 Mar 2015	
4. TITLE AND SUBTITLE Cold Environment Assessment Tool (CEAT) User's Guide for Apple Mobile Devices				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) David Sauter				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Research Laboratory ATTN: RDRL-CIE-D White Sands Missile Range, NM 88002-5501				8. PERFORMING ORGANIZATION REPORT NUMBER ARL-TR-7324	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited.					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Working in cold environments can adversely impact Soldier effectiveness and result in serious health effects or even death. This technical note describes an easy to use mobile application that can be used to provide guidance to help mitigate these effects.					
15. SUBJECT TERMS cold environment, Soldier effectiveness					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 14	19a. NAME OF RESPONSIBLE PERSON David Sauter
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (Include area code) (575) 678-2078

Contents

List of Figures	iv
1. Introduction	1
2. CEAT Inputs	1
3. CEAT Guidance	3
4. Summary and Conclusions	5
5. References and Notes	6
Distribution List	7

List of Figures

Fig. 1	Launch CEAT	2
Fig. 2	Input view	3
Fig. 3	Guidance view	4
Fig. 4	Information view	5

1. Introduction

Beginning in the year 2000, there were an average of over 350 cold weather-related injuries in the US Army every year.¹ The Cold Environment Assessment Tool (CEAT) application (from here on also referred to as the “app”) for iOS (Apple mobile operating system) mobile devices (smart phones and tablets) attempts to address this issue by providing guidance regarding cold weather training and missions as a function of air temperature, wind speed, and work intensity. CEAT is based on information found in the “Prevention and Management of Cold-Weather Injuries” Technical Bulletin (TB) Medical 508² and the “Field Hygiene and Sanitation” Field Manual (FM) 21-10.³ Output consists of the computed wind chill temperature,⁴ the time until frostbite, and recommended preventive measures.

CEAT was developed for mobile devices to address the issue of adverse impacts due to the cold. Availability on a mobile device ensures that this guidance is readily available at lower echelons and/or remote locations where laptop or desktop computing platforms and/or network connections back to a higher echelon (from which guidance would likely be disseminated) are not available. For a more detailed discussion of mobile Android device relevance to the military see, “Android Smartphone Relevance to Military Weather Applications”.⁵

2. CEAT Inputs

To launch CEAT, tap the CEAT icon on the device start screen (Fig. 1). The initial input tab is then displayed for the user to enter the weather and work information (Fig. 2). The temperature and wind values are used in the computation of the wind chill which is required to determine the guidance. The “Work Intensity” element is used to select the appropriate work rate. FM 21-10 defines the 3 work intensity levels as:

- Sedentary: Sentry duty, eating, resting, sleeping, clerical work
- Low: Walking, marching without rucksack, drill and ceremony
- High: Digging foxhole, running, marching with rucksack, making or breaking bivouac

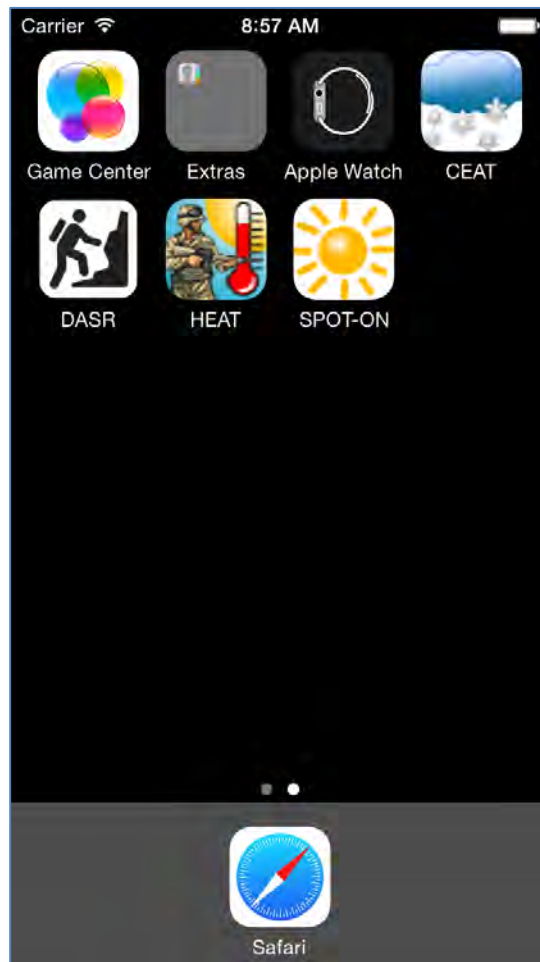


Fig. 1 Launch CEAT

Carrier 8:34 AM

Temperature: 0 deg F

Wind: 22 mph

Work Intensity:

Sedentary Low High

Navigation icons: Blue square with white arrow, Clipboard icon, Information icon

Fig. 2 Input view

3. CEAT Guidance

After any desired edits have been made to the Input view, tapping the “Guidance” tab (represented by the icon of a clipboard at the bottom center of the screen) will result in the “Computed wind chill (deg F)”, “Time until Frostbite (minutes)” and “Preventive Measures” information being computed and displayed (Fig. 3). Note that the “Time until Frostbite (minutes)” represents the time “until the occurrence of cheek frostbite in the most susceptible 5 percent of personnel” (per TB MED 508).³

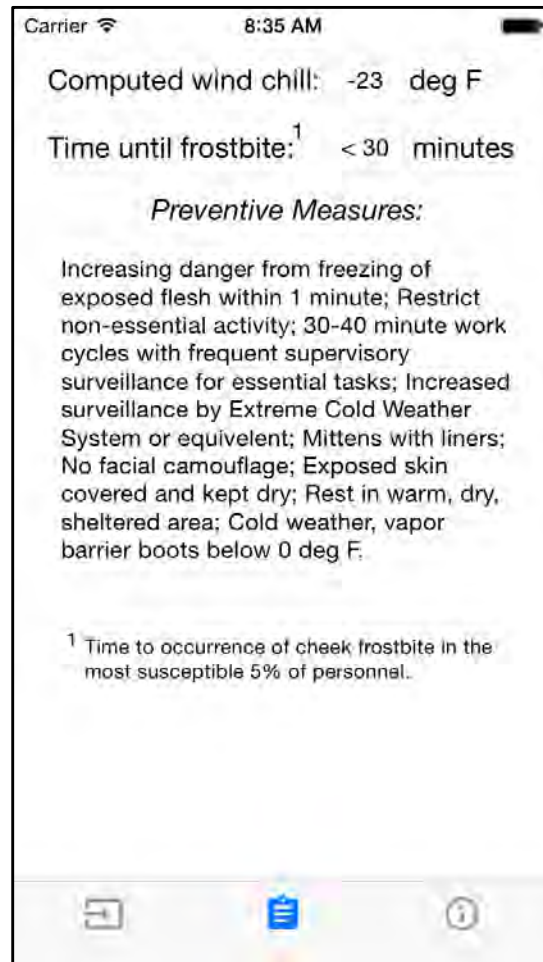


Fig. 3 Guidance view

The last view (Fig. 4), displayed by tapping the icon of an “i” in a circle, and provides the POC information, version and date of the app.

Upon app exit, current values for all of the user inputs will be stored such that they will be the default values displayed when the app is next run.



Fig. 4 Information view

4. Summary and Conclusions

CEAT provides easy to use and readily understood guidance regarding personnel training or operations in a cold environment. Output is based on information found in an Army field manual and technical bulletin while the wind chill temperature is computed from a National Weather Service formula. Hosting on a mobile device should make it accessible virtually anywhere in a tactical or training environment.

After internal testing and evaluation (2015) the app will be submitted to the Defense Information Systems Agency (DISA) Mobile Application Store (MAS) for validation and with plans for eventual availability to Department of Defense users.

5. References and Notes

1. Arneson-Baker, V. Understanding and preventing cold weather injuries. [Available online at http://www.army.mil/article/32484/Understanding_and_preventing_cold_weather_injuries/], 2010.
2. Department of the Army, Headquarters and Marine Corps, Commandant. Field Hygiene and Sanitation. Field Manual 21-10. [Available online at http://armypubs.army.mil/doctrine/Active_FM.html], 2000.
3. Department of the Army, Headquarters. Prevention and Management of Cold-Weather Injuries. Technical Bulletin Medical 508. [Available online at <http://armypubs.army.mil/med/index.html>], 2005.
4. National Weather Service. NWS Windchill Chart. [Available online at <http://www.nws.noaa.gov/os/windchill/index.shtml>], 2013.
5. Sauter, D. Android smartphone relevance to military weather applications. White Sands Missile Range (NM): Army Research Laboratory (US); 2011. Report No.: ARL-TR-5793. Also available at http://www.arl.army.mil/www/default.cfm?technical_report=6279.

1 DEFENSE TECHNICAL
(PDF) INFORMATION CTR
DTIC OCA

1 GOVT PRINTG OFC
(PDF) A MALHOTRA

2 DIRECTOR
(PDF) US ARMY RESEARCH LAB
RDRL CIO LL
IMAL HRA MAIL & RECORDS
MGMT

1 DIRECTOR
(PDF) US ARMY RESEARCH LAB
RDRL CIE D
D SAUTER

INTENTIONALLY LEFT BLANK.